Allogeneic stem cell transplant

Some people with lymphoma need high-dose treatment followed by a stem cell transplant. This page is about allogeneic stem cell transplants, where the stem cells come from a donor. We have a separate information page about autologous stem cell transplants, which use your own cells.

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What are stem cells?

Blood stem cells are found in your bone marrow. They constantly make new blood cells, including cells of your immune system, like white blood cells. Your immune system fights infection. It also protects your body from cancer by looking for, and getting rid of, cells that are becoming abnormal. In lymphoma, this ‘search and destroy’ system does not work properly and abnormal lymphoma cells build up.

What is an allogeneic stem cell transplant?

An allogeneic stem cell transplant is a stem cell transplant that uses stem cells from a donor (someone else). This type of transplant is also sometimes called a ‘donor stem cell transplant’ or an ‘allograft’.
In an allogeneic stem cell transplant, you have anti-cancer treatment, which kills both lymphoma cells and your own blood stem cells. You are then given blood stem cells from a donor. The donor stem cells settle in your bone marrow and start to make new, healthy blood cells. This can:

- restore your ability to make blood cells after high-dose treatment
- give you a new immune system from your donor.

The new blood cells can recognise lymphoma cells as foreign and can get rid of them. This is known as the **graft-versus-lymphoma effect**. The cells produced by the donor stem cells can recognise and kill any lymphoma cells that develop in the future, too. This means they can help prevent lymphoma relapsing (coming back).

### Who might have an allogeneic stem cell transplant?

Allogeneic stem cell transplants can be a very effective treatment for some people with lymphoma. They can give a better chance of a long-lasting remission (no evidence of lymphoma), or even a cure, than standard treatments.

However, an allogeneic stem cell transplant is a very intensive form of treatment and you have to be fit enough to have it. There is a risk of serious infections while your immune system is recovering. Additionally, the donor cells can attack your healthy tissues in a **graft-versus-host effect**. This can cause serious, even life-threatening, side-effects. Rarely, your body might reject the donor cells (graft rejection), which means your blood counts do not recover. In this case, you may need another transplant.

An allogeneic stem cell transplant is only offered to some people with:

- lymphoma that has not responded well to earlier treatment (‘refractory’ lymphoma)
- lymphoma that has relapsed (come back) after earlier treatments, particularly if this has happened quickly or has happened more than once
- a type of lymphoma that can’t be treated effectively with conventional chemotherapy.

Your medical team also consider other factors, including:

- your age and general health – how healthy your organs are and the impact of any other medical conditions that you have
- whether there is a suitable donor.

Deciding whether to have an allogeneic transplant can be difficult. Allogeneic stem cell transplants can give a chance of cure for people with few other treatment options. However, there is a risk of serious side effects and complications. Your medical team should tell you what is involved and if there are any other treatment options.
You should consider very carefully all the possible risks and benefits of having a stem cell transplant. Ask as many questions as you need to reach a decision. Your medical team are best-placed to give you advice specific to your situation. However, you might also find it helpful to speak to another person who has had an allogeneic stem cell transplant. Our Information and Support team may be able to put you in touch with someone through our Buddy scheme.

What is involved in an allogeneic stem cell transplant?

An allogeneic stem cell transplant needs a lot of preparation and recovery takes several months. It can help to think of the process in stages:

**Preparation**

Only certain treatment centres carry out allogeneic stem cell transplants so your doctor might need to refer you to a transplant centre. Your transplant coordinator (usually a clinical nurse specialist) is your key contact during the transplant preparations. They organise the search for a donor, order any tests you need, and plan the timetable for the transplant with you.

The weeks and months before your stem cell transplant involve a lot of preparation. You have tissue typing tests so that your medical team can find a donor. You also have:

- tests to make sure you are well enough to have a stem cell transplant. These include blood tests and tests to check how well your organs are working, eg your lungs, heart and kidneys
- fitting a central venous catheter (sometimes called a ‘central line’, eg a PICC line or Hickman® or Groshong® line) if you don’t already have it. This is a line (thin tube) in your vein that stays in place throughout your treatment making it easier for your medical team to give you drugs
- other tests and scans to check on your lymphoma, if needed
- chemotherapy to reduce your lymphoma before your conditioning treatment if you have relapsed or have lymphoma leftover after a previous treatment. This is sometimes called ‘salvage chemotherapy’ or ‘remission induction’.

The treatment involved in an allogeneic stem cell transplant could affect your fertility. Speak to your doctor about whether this is likely and about how you can preserve your fertility. Your medical team can also offer advice about contraception. It is strongly advised that you or your partner do not become pregnant until it is safe to do so after your treatment.
As you prepare for your transplant, think about the support you might need at home and work during your treatment and recovery. Your medical team can advise you. It can take up to a year to recover from an allogeneic stem cell transplant and many people do not feel well enough to return to work for many months.

Your donor

Your transplant is most likely to be successful if your donor’s tissues closely match your own. You have a blood test that looks at the type of human leukocyte antigen (HLA) found on your cells. HLAs are proteins. These proteins help your immune system recognise cells that belong in your body. Your medical team try to find a donor whose HLA types match your own as closely as possible.

Your siblings (brothers or sisters) inherit their tissue type from the same parents as you and are most likely to have a tissue type that matches yours. Around 1 in 3 people have a sibling who is a good match. If your siblings are not a good match or if you have no siblings, your medical team look for a volunteer whose tissue type matches yours as closely as possible. There are registers of volunteers. A transplant using stem cells from a volunteer is called a ‘matched unrelated donor’ (MUD) transplant.

Some people have unusual tissue types, which means that other sources of stem cells have to be found. Sources include:

- umbilical cord blood from an unrelated donor – registers of stored umbilical cord blood are available
- a relative whose tissue type half matches yours – a haploidentical donor.

Umbilical cord blood is more likely to be used for children than adults, but adults might be able to have stem cell transplants using cord blood from more than one source. Cord blood does not have to be as closely matched to your tissue type as other sources of stem cells. Your transplant team can give you more information about the source of stem cells for your transplant.

Stem cells are usually collected from the donor’s blood stream (peripheral blood stem cell transplant). Your donor is given injections of a growth factor called G-CSF once a day for a few days. This causes your donor’s body to make more stem cells and helps the stem cells move from the bone marrow into the bloodstream. Your donor goes into hospital for a few hours to have their stem cells harvested (collected) from their bloodstream.

Sometimes the stem cells are taken directly from the donor’s bone marrow (a bone marrow transplant) during a short procedure under general anaesthetic.

A donor is given information on what to expect when they donate their stem cells.

The NHS website also has helpful information on what is involved in being a donor.
Conditioning

Conditioning is the anti-lymphoma treatment you have before your transfusion of donor stem cells. Conditioning aims to reduce or destroy your own bone marrow. This makes room for the healthy donor stem cells and stops your own immune system rejecting them. The conditioning treatment also kills leftover lymphoma cells in your body. There are different intensities of conditioning treatment:

- full intensity or ‘myeloablative’ treatment – high-doses of chemotherapy and possibly radiotherapy, given with the aim of destroying your bone marrow
- reduced intensity treatment — lower doses of chemotherapy, which reduce your bone marrow.

Some people who cannot have full intensity treatment might be able to have reduced intensity treatment, which can cause less severe side effects. However, the risk of relapse may be higher with reduced intensity treatment. There are clinical trials investigating when reduced intensity treatment is best used.

You usually have conditioning treatment for a few days. Most people go into hospital to have their conditioning treatment and stay there until their blood counts have recovered to safe levels after their stem cell transplant. Some people have some of the treatment as an outpatient and go into hospital when their blood counts become low. Most people stay in hospital for a few weeks to have a stem cell transplant.

A few people have total body irradiation (TBI), which is a form of radiotherapy, as part of their conditioning. If you have TBI, it is usually given just after your high-dose chemotherapy and before the stem cells are given to you.

Your medical team should explain what conditioning treatment they recommend and why, as well as what is involved.

During this stage, you are also given other treatments to:

- help with any side effects of your conditioning treatment
- prevent your body rejecting the donor stem cells.

Stem cell transfusion

You have your stem cell transplant 1–2 days after finishing your conditioning treatment.

On the day of your transplant, the donor stem cells are given to you through your central line, just like a blood transfusion. You are monitored while the stem cells are given. The transfusion usually takes around 40 minutes.

Your medical team usually call your transplant day ‘day zero’. They measure your recovery time starting from this day.
**Engraftment**

Once the donated stem cells are in your bloodstream they make their way to your bone marrow. Then they ‘graft’ onto your bone marrow and start dividing to make new blood cells. This process is called ‘engraftment’. Engraftment usually takes 2–3 weeks but can sometimes take longer.

‘Then came the waiting until the donor’s stem cells started to grow within my bone marrow. During this time, I was isolated in my own room and felt a bit like I was just one big lab sample at times! The biggest problem for me was the boredom. I didn’t have the energy or the concentration to read and, although the internet is wonderful, even being online becomes boring after a while. I found the music I have always loved helped enormously. It helped to drown out the bleeping and the air conditioning and it blocked out an empty-feeling echo in the room.’ Kat, diagnosed with double-hit lymphoma at 32

During the engraftment process, you have a high risk of side effects related to low blood counts.

While you are waiting for your blood counts to recover, you have supportive care treatments. These help to protect your body while your blood counts are low and to treat the side effects of your conditioning treatment. You might have:

- treatments and precautions to reduce the risk of infection
- blood transfusions if you are anaemic (low red blood cells). Anaemia can make you very tired and sometimes short of breath
- platelet transfusions if you have thrombocytopenia (low platelets). Platelets help with blood clotting. Tell your nurse if you notice any signs of bleeding like blood in your urine or faeces (poo), bleeding gums or a nosebleed
- treatments for side effects from your high-dose treatment, like sore mouth, diarrhoea, nausea and vomiting. Radiotherapy can cause sore skin, similar to sunburn.

Although your risks are highest in the first few weeks after your transplant, it can take many months for your blood counts to build up. Your supportive care continues when you leave hospital. You should follow any precautions your medical team recommends to help you stay well.

Graft failure means that the transplanted stem cells failed to engraft. In this case, your blood counts do not recover. Graft failure is rare. If engraftment does fail, you need a second transplant.
What are the risks of an allogeneic stem cell transplant?

You are monitored closely during your recovery from an allogeneic stem cell transplant. The main risks are:

- risk of infection
- graft-versus-host disease (GvHD).

Risk of infection

Infection can come from many sources, including the microbes that live normally on your own body. They can come from other people, the environment or even the food you eat. Normally our immune system fights these infections off before they take hold but if you have reduced or no immunity you can develop very serious infections.

Neutropenia and bacterial infection

When your levels of neutrophils (a type of white blood cell) are low, this is called ‘neutropenia’. Neutrophils fight infection, particularly from bacteria, so you are at high risk of infection while they are low.

Measures to reduce your risk of infection include:

- close monitoring for signs of infection. Please note, you might have an infection without an increase in temperature or pulse, so tell your nurses if you feel unwell
- good hygiene. Your room should be cleaned every day and you must shower and wash your hands regularly
- treatments to prevent infection, like antibiotics and mouthwashes
- growth factor injections to boost your blood counts
- eating the right things (sometimes called a ‘neutropenic diet’) – some foods are not recommended because they are more likely to carry bacteria, eg unpasteurised cheese and takeaway food
- rules for visitors, especially in the few days just after your transplant.

Although taking precautions can reduce your risk of infection, you cannot avoid all sources of infection. Most people develop infections after an allogeneic stem cell transplant. Infections can be treated, particularly if they are caught early.
Contact your medical team immediately if you have any symptoms of infection, no matter how minor or vague they seem. Signs of infection include, but are not limited to:

- fever (temperature above 38°C in adults)
- shivering
- chills and sweating
- feeling generally unwell, confused or disoriented
- earache, cough, sore throat or mouth
- redness and swelling around skin sores, injuries to intravenous lines
- diarrhoea
- a burning or stinging sensation when passing urine
- unusual vaginal discharge or itching
- unusual stiffness of the neck and discomfort around bright lights.

**Viral infections**

Before your transplant, you have blood tests to see if you have had certain viral infections in the past. In particular, you are tested for cytomegalovirus (CMV), adenovirus and Epstein–Barr virus (EBV) infections. These are common viral infections that many people have had, sometimes without having any symptoms. These viruses remain dormant (inactive) in the body and can flare up when your immune system is low. Your blood is checked regularly during your recovery in case a viral infection flares up without causing any symptoms.

More than half the population have been infected with CMV, in many cases without having any symptoms. If possible, you will have a donor who has the same CMV status as you. CMV can cause serious problems if it flares up after a stem cell transplant, including pneumonia. If your blood tests show CMV is present – even if you have no symptoms – you will need treatment with antiviral drugs in hospital for up to 2–3 weeks. You might need more than 1 course of anti-CMV treatment during your recovery.

**Graft-versus-host disease**

Graft-versus-host disease (GvHD) is a common complication of an allogeneic stem cell transplant. It is the main disadvantage of having this kind of transplant.

GvHD happens because your new immune system (the graft) recognises the other cells in your body (the host) as ‘foreign’ and attacks them. This can be useful as your new immune system kills your lymphoma cells (graft-versus-lymphoma) and in most cases, symptoms are mild to moderate.

‘We are seeing what is suspected to be mild GvHD in the form of, how shall I put this, green poo. I was a bit taken aback but on reflection it’s good to see a bit of GvHD as it’s taken as a good sign. In my head I’m picturing the new immune system fighting the lymphoma too – little Incredible Hulks in there fighting cancer and turning everything green.’ Trevor, diagnosed with follicular lymphoma at 42.
However, GvHD can cause serious and sometimes life-threatening symptoms.

GvHD can happen even if your donor was an identical HLA tissue match.

GvHD can start 2–3 weeks after your transplant. If it starts within 100 days of your transplant it is called ‘acute’ GvHD. If it starts later than this, it is called ‘chronic’ GvHD.

**Symptoms of acute GvHD**

Acute GvHD mainly affects the skin, the gut and the liver and can cause:

- red spots, which can spread across the body into a rash (which occasionally blisters)
- diarrhoea, which might be watery or bloody; vomiting, weight loss and abdominal (tummy) pain
- fever
- jaundice.

Acute GvHD is usually graded (stage 1–4) according to how severe it is. Grading helps your doctor to decide what treatment to give you.

**Symptoms of chronic GvHD**

Chronic GvHD can develop even if you didn’t have acute GvHD. It most often affects the mouth, skin, gut and liver. It can also affect other areas, eg your eyes, your joints and your lungs.

You should contact your medical team straightaway if you develop any of these problems:

- skin rashes, flaking or itchy skin, changes in skin colour or texture, tightening of the skin
- dry or irritated eyes
- dry or sore mouth
- thinning of your hair
- diarrhoea, nausea or unexplained weight loss.

Your doctor should assess you for GvHD regularly as part of your follow-up. If you have any signs of GvHD, you will have tests to find out what areas of your body are affected and how severe it is. These might include blood tests, x-rays and scans.

**Prevention and treatment of GvHD**

You are given treatment with your conditioning and after the transplant to suppress your immune system and try to prevent severe GvHD. Sometimes GvHD develops when your immune suppression drugs are reduced, so your medical team monitor you closely.
If you develop GvHD, you might need to increase your immune suppression drugs, eg ciclosporin. You might need high doses of steroids to suppress your immune system. If these do not control it, there are a range of other treatments that suppress your immune system.

Your doctor chooses your treatment based on your individual circumstances, eg what parts of your body are affected. As treatments for GvHD suppress your immune system, they can make you more likely to develop infections. Controlling GvHD often involves getting the right balance of medication.

Anthony Nolan produce a booklet about GvHD, which you can find at bit.ly/2rlkQfs.

**What happens after an allogeneic stem cell transplant?**

You can usually go home when your blood cell counts have recovered enough. This is often a few weeks after your transplant. It can be longer, particularly if you develop a serious infection or other complications.

You are likely to feel very tired, weak and unwell to start with. Give yourself time to recover. It usually takes many months to recover from an allogeneic stem cell transplant. You spend much of this time at home as you need to avoid exposure to infection.

‘The docs have been to see me and given their thumbs up to go home. Good news, but I’m feeling apprehensive. Maybe it’s because I’m leaving the protective environment of my room and going back out into the big, bad world. I still have a long way to go and could end up straight back in hospital at the slightest sign of infection or fever. My immune system will be very low for a few months, so I’ll need to be very careful.’ Trevor, diagnosed with follicular lymphoma at 42.

You might still need to have more transfusions of red blood cells or platelets after you go home. You will also be on several treatments to prevent GvHD and infections. You might have a transfusion of white blood cells from your donor to boost the graft-versus-lymphoma effect. This is called a ‘donor lymphocyte infusion’ (DLI) and can be done as an outpatient.

You are seen in the clinic at least once a week for the first few months. You have regular tests to:

- check your blood counts
- measure your virus levels
- look for GvHD
- assess the impact the transplant has had on your lymphoma.

You are still at risk of side effects such as infections and GvHD when you go home. It is common to have to go back into hospital for treatment in the weeks and months that follow your transplant.
As time goes on and your immune system recovers, your risk of serious complications decreases. Make sure you know what to look out for and how to reduce the risk of getting an infection. Your medical team should give you numbers to call at any time of day if you are worried.

Gradually, you are seen less often. Your appointments are to monitor your lymphoma and to look out for complications, such as chronic GvHD and late side effects of your conditioning treatment. You need to continue to take precautions to avoid infection – your medical team can advise you what to consider at each stage of your recovery.

About 6–18 months after your transplant, you are given a course of vaccinations to replace the immunity you lost when your new immune system replaced your own.

Where can I find more information and support?

Recovering from a stem cell transplant can be a difficult time. Having a stem cell transplant has an emotional impact, as well as a physical one. You might find our section on living with lymphoma helpful for more information on emotional wellbeing, day-to-day practicalities and staying well physically.

It can help to talk to other people who have gone through a similar experience. Our Information and Support team might be able to put you in touch with someone else who has had a stem cell transplant through our Buddy scheme. They can also offer a listening ear if you need to talk – call us on 0808 808 5555, email at information@lymphomas.org.uk, text 07786 202030 or Live Chat via our website www.lymphomas.org.uk.

We have online forums where you can ask questions and get support from other people affected by lymphoma or a stem cell transplant.

Anthony Nolan also has an online transplant community.

Sources used

These are some of the sources we used to prepare this information. The full list of sources is available on request. Please contact us by email at publications@lymphomas.org.uk or phone on 01296 619409 if you would like a copy.


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We continually strive to improve our resources for people affected by lymphoma and we would be interested in any feedback you might have about this information. Please visit www.lymphomas.org.uk/feedback or email publications@lymphomas.org.uk if you have any comments. Alternatively please phone our helpline on 0808 808 5555.

If you have found this information useful and would like to help make it available to other people coping with lymphoma, then please consider making a donation to support our work at www.lymphomas.org.uk/donate. We rely totally on voluntary donations. Thank you.

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